

Tier III Cab Glazing Task Group Recommendations

The following are provided as recommendations to the Railroad Safety Advisory Committee for consideration in conjunction with the recommended draft ruletext for a Notice of Proposed Rulemaking (ETF_001-02 – Proposed Ruletext for NPRM 1). These recommendations will be adapted into ruletext prior to publishing the proposed rule. Please note, this does not represent regulatory text in any form and is intended for discussion and voting purposes only.

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End-facing Glazing

Large Object Impact Test

Recommendation:

- Adopt modified criteria based on relevant portions of UIC651 and EN 15152 standards:
 - EN 15152 projectile, as defined in UIC 651 (mass, shape, material)
 - Speed: maximum operating speed + 100mph (may consider increased differential due to adjacent track operating conditions)
 - Impact angle = angle of installation
 - Sample size: full scale sample of the glazing article with the **smallest** dimension installed
 - Curved glazing to be addressed as prescribed in EN 15152
 - Fixture should be representative of the actual manner in which the glazing is mounted on the vehicle

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Temperature: 4 tests (2 each at 32° and 68°F (0° and 20°C)). For the tests to be valid it shall be demonstrated that the core temperature of the complete glazing article during each test is within the required temperature range.

- Witness plate (500 mm x 500 mm x 0.15 mm thick aluminum (19.7" x 19.7" x 0.006" thick)) is mounted vertically 500 mm (19.7") from the point of impact of projectile, or the distance between the point of impact of the projectile and the operator's eyes, whichever is less
- Point of impact of projectile is at geometric center of glazing
- The center of the witness plate is aligned with the point of impact.
- The projectile velocity shall be measured within 13 feet (4 m) of the point of impact.
- A new projectile is used for each test.
- Use of representative samples for large object impact testing of large Tier III end-facing cab glazing articles shall be allowed under the conditions described in EN15152.
- Qualification metrics:
 - No penetration
 - No marks on witness plate
 - No failure of mounting apparatus

Reasoning:

- The Task Group proposes to adopt the test criteria and performance metrics from EN 15152, as the methods and criteria represent a proven approach to large object impact performance testing of high speed trainsets. The criteria, conditions, and methodology provide an increase in protection over current Type I requirements for large object impact protection, and employ a test methodology that is more stringent and controlled.

Small Object Impact Test

Recommendation:

- Not required.

Reasoning:

- The Task Group agreed that this glazing qualification test is more useful as an indicator of maintainability and unnecessary if a ballistics standard is also imposed.

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Side-facing Cab Glazing

Definition

Recommendation:

- The Group proposes that the current definition in 49 CFR Part 223 be **modified as noted**, for Tier III end-facing glazing, for clarification:

49 CFR Part 223: *End facing glazing location* means any location, **in exterior walls or doors**, where a line perpendicular to the plane of the glazing material makes a horizontal angle of 50 degrees or less with the centerline of the locomotive, caboose or passenger car. Any location which, due to curvature of the glazing material, can meet the criteria for either a front facing location or a side facing location shall be considered a front facing location.

Reasoning:

- Task Group believes the current “50 degrees or less” definition in 49 CFR Part 223 is adequate to ensure that glazing exposed to end-facing risks, due to aerodynamic designs, are treated appropriately. The Task Group is recommending a slight change to the definition, however, to clarify that the glazing requirement only applies only to exterior glazing. This has been a point of confusion in the past and such clarification is present in other international standards (e.g. UIC 651).

Large Object Impact Test

Recommendation:

- Use current Type II large object impact test.

Reasoning:

- The Task Group agreed that it is not appropriate to include the large object impact requirement specified for end-facing glazing in Part 223 for Tier III cab side-facing glazing, since this requirement provides protections against hazards presented *in the direction of motion*. Although the side-facing glazing is not exposed to the same risk as end-facing glazing, some level of impact test is required to ensure that the mounting is sufficient and safe for normal operations. The current Type II large object impact test for side-facing glazing would suffice to serve this purpose.

Small Object Impact Test

Recommendation:

- Not required.

Reasoning:

- As with the forward-facing glazing, the Task Group agreed that this glazing qualification test is more useful as an indicator of maintainability and unnecessary if a ballistics standard is also imposed.

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General Requirements for All Tier III Cab Glazing

Ballistic Penetration Resistance (all cab glazing)

CONSENSUS NOT REACHED – Decision deferred to FRA

Reasoning:

- Industry representatives recommend no change to existing ballistic penetration requirement for end- and side-facing glazing.
- Labor representatives would prefer requirements which “raise the bar” to some degree, taking advantage of the state-of-the-art in glazing design and defers to FRA to draft NPRM language related to ballistic penetration requirements for Tier III cab glazing.
- Use of a 9mm standard bullet in lieu of the current .22LR requirement was examined in detail, but very little statistical data was available to determine whether or not this would provide an appreciable measure of safety over current conditions. Without evidence that the current standard is inadequate, any proposed change may not justify its cost/benefit. As an alternative, it was proposed that the current bullet speed be raised to the actual muzzle velocity for a standard .22LR. Industry did not agree with this change, and it is unclear what cost/benefit this change would have.

Spall Protection (all cab glazing)

Recommendation:

- Protection should be prescribed by the appropriate test metric (large object impact, etc.). **No reference** to specific spall protection methods (e.g. “spall shield”) should be included.

Reasoning:

- Discussion began in the Group with proposed language to specify use of “spall shields” to provide additional protection.
- Yet it was considered that spall protection (if present) is an integral part of the glazing system and may (or may not) be required to satisfy performance requirements. Specifically requiring passive spall protection technology could severely limit innovation and the use of state-of-the-art technology now, and in the future.
- Regardless, the Task Group agreed that the use of the term “No spall,” in itself, is misleading and the term should not be used in the regulation. The intent is that a successful test results in no marks on the witness plate; spalling in insignificant amounts could be allowed.

Certification/Recertification requirements (all cab glazing)

Recommendation:

- In lieu of the first paragraph of Appendix A of Part 223, the proposed Tier III language should include:
 - (a) Tests performed on glazing materials for compliance with this part shall be certified by either:

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- (1) An independent third party (lab, facility, underwriter); or
 - (2) The glazing manufacturer, by providing FRA with the opportunity to witness all tests by written notice, a minimum of 30 days prior to testing.
- (b)(1) Any glazing material certified to meet the requirements of this part shall be re-certified by the same means [as originally certified] if any change is made to the production process or physical glazing design that may affect its mechanical properties or its mounting arrangement on the vehicle.
- (2) Glazing procured from an entity other than the original glazing supplier for which a design was first certified as compliant must also be re-certified.
- (c) All certification/re-certification documentation shall be made available to FRA upon request.

Reasoning:

- Current requirements in 49 CFR 223 are silent on requirements for situations where re-certification may be necessary. The Task Group believes the proposed Tier III requirements will help ensure that any glazing used for high-speed operations are appropriately certified to meet the performance criteria, and that any changes made after initial certification are assessed to ensure there is no degradation in safety.
- Labor representatives also noted the desire for an increased periodic re-evaluation of the glazing performance requirements, to take advantage of advances in glazing technology.